

Cell Questions

1. Figure 4.7 (<https://openstax.org/books/biology-2e/pages/4-2-prokaryotic-cells#fig-ch04-02-03>) Prokaryotic cells are much smaller than eukaryotic cells. What advantages might small cell size confer on a cell? What advantages might large cell size have?

2. Figure 4.8 If the nucleolus were not able to carry out its function, what other cellular organelles would be affected?

3. Figure 4.18 If a peripheral membrane protein were synthesized in the lumen (inside) of the ER, would it end up on the inside or outside of the plasma membrane?

4. When viewing a specimen through a light microscope, scientists use _____ to distinguish the individual components of cells.

- a. a beam of electrons
- b. radioactive isotopes
- c. special stains
- d. high temperatures

5. The _____ is the basic unit of life.

- a. organism
- b. cell
- c. tissue
- d. organ

6. Prokaryotes depend on _____ to obtain some materials and to get rid of wastes.

- a. ribosomes
- b. flagella
- c. cell division
- d. diffusion

7. Bacteria that lack fimbriae are less likely to _____.

- a. adhere to cell surfaces
- b. swim through bodily fluids
- c. synthesize proteins
- d. retain the ability to divide

8. Which of the following organisms is a prokaryote?

- a. amoeba
- b. influenza A virus



- c. charophyte algae
- d. E. coli

9. Which of the following is surrounded by two phospholipid bilayers?

- a. the ribosomes
- b. the vesicles
- c. the cytoplasm
- d. the nucleoplasm

10. Peroxisomes got their name because hydrogen peroxide is:

- a. used in their detoxification reactions
- b. produced during their oxidation reactions
- c. incorporated into their membranes
- d. a cofactor for the organelles' enzymes

11. In plant cells, the function of the lysosomes is carried out by _____.

- a. vacuoles
- b. peroxisomes
- c. ribosomes
- d. nuclei

12. Which of the following is both in eukaryotic and prokaryotic cells?

- a. nucleus
- b. mitochondrion
- c. vacuole
- d. ribosomes

13. Tay-Sachs disease is a genetic disorder that results in the destruction of neurons due to a buildup of sphingolipids in the cells. Which organelle is malfunctioning in Tay-Sachs?

- a. lysosome
- b. endoplasmic reticulum
- c. peroxisome
- d. mitochondria

14. Which of the following is not a component of the endomembrane system?

- a. mitochondrion
- b. Golgi apparatus
- c. endoplasmic reticulum

d. lysosome

15. The process by which a cell engulfs a foreign particle is known as:

a. endosymbiosis

b. phagocytosis

c. hydrolysis

d. membrane synthesis

16. Which of the following is most likely to have the greatest concentration of smooth endoplasmic reticulum?

a. a cell that secretes enzymes

b. a cell that destroys pathogens

c. a cell that makes steroid hormones

d. a cell that engages in photosynthesis

17. Which of the following sequences correctly lists in order the steps involved in the incorporation of a proteinaceous molecule within a cell?

a. protein synthesis of the protein on the ribosome; modification in the Golgi apparatus; packaging in the endoplasmic reticulum; tagging in the vesicle

b. synthesis of the protein on the lysosome; tagging in the Golgi; packaging in the vesicle; distribution in the endoplasmic reticulum

c. synthesis of the protein on the ribosome; modification in the endoplasmic reticulum; tagging in the Golgi; distribution via the vesicle

d. synthesis of the protein on the lysosome; packaging in the vesicle; distribution via the Golgi; tagging in the endoplasmic reticulum

18. Congenital disorders of glycosylation are a growing class of rare diseases. Which organelle would be most commonly involved in the glycoprotein disorder portion of the group?

a. RER

b. ribosomes

c. endosomes

d. Golgi apparatus

19. Which of the following have the ability to disassemble and reform quickly?

a. microfilaments and intermediate filaments

b. microfilaments and microtubules

c. intermediate filaments and microtubules

d. only intermediate filaments

20. Which of the following do not play a role in intracellular movement?

- a. microfilaments and intermediate filaments
- b. microfilaments and microtubules
- c. intermediate filaments and microtubules
- d. only intermediate filaments

21. In humans, ____ are used to move a cell within its environment while ____ are used to move the environment relative to the cell.

- a. cilia, pseudopodia
- b. flagella; cilia
- c. microtubules; flagella
- d. microfilaments; microtubules

22. Which of the following are only in plant cells?

- a. gap junctions
- b. desmosomes
- c. plasmodesmata
- d. tight junctions

23. The key components of desmosomes are cadherins and _____.

- a. actin
- b. microfilaments
- c. intermediate filaments
- d. microtubules

24. Diseased animal cells may produce molecules that activate death cascades to kill the cells in a controlled manner. Why would neighboring healthy cells also die?

- a. The death molecule is passed through desmosomes.
- b. The death molecule is passed through plasmodesmata.
- c. The death molecule disrupts the extracellular matrix.
- d. The death molecule passes through gap junctions.

25. In your everyday life, you have probably noticed that certain instruments are ideal for certain situations. For example, you would use a spoon rather than a fork to eat soup because a spoon is shaped for scooping, while soup would slip between the tines of a fork. The use of ideal instruments also applies in science. In what situation(s) would the use of a light microscope be ideal, and why?

26. In what situation(s) would the use of a scanning electron microscope be ideal, and why?

27. In what situation(s) would a transmission electron microscope be ideal, and why?

28. What are the advantages and disadvantages of each of these types of microscopes?

29. Explain how the formation of an adult human follows the cell theory.
30. Antibiotics are medicines that are used to fight bacterial infections. These medicines kill prokaryotic cells without harming human cells. What part or parts of the bacterial cell do you think antibiotics target? Why?
31. Explain why not all microbes are harmful.
32. You already know that ribosomes are abundant in red blood cells. In what other cells of the body would you find them in great abundance? Why?
33. What are the structural and functional similarities and differences between mitochondria and chloroplasts?
34. Why are plasma membranes arranged as a bilayer rather than a monolayer?
35. In the context of cell biology, what do we mean by form follows function? What are at least two examples of this concept?
36. In your opinion, is the nuclear membrane part of the endomembrane system? Why or why not? Defend your answer.
37. What are the similarities and differences between the structures of centrioles and flagella?
38. How do cilia and flagella differ?
39. Describe how microfilaments and microtubules are involved in the phagocytosis and destruction of a pathogen by a macrophage.
40. Compare and contrast the boundaries that plant, animal, and bacteria cells use to separate themselves from their surrounding environment.
41. How does the structure of a plasmodesma differ from that of a gap junction?
42. Explain how the extracellular matrix functions.
43. Pathogenic *E. coli* have recently been shown to degrade tight junction proteins during infection. How would this provide an advantage to the bacteria?